

VITAL SIGNS

PENNSYLVANIA



Business leaders in Pennsylvania have sounded an alarm. They cannot find the science, technology, engineering and mathematics (STEM) talent they need to stay competitive. Students' lagging performance in K–12 is a critical reason why.

To address this challenge, Pennsylvania is raising the bar. The state has joined 44 others in adopting rigorous math standards for K–12—the Common Core State Standards—and it is working with other states to create robust tests aligned to those standards. These are promising developments, but to succeed amid profound practical, political and financial challenges the state has to maintain its resolve.

Pennsylvania needs to ensure that schools and students have opportunities to meet higher expectations: Not enough students—least of all minorities—have the chance to learn challenging content to prepare them for college and careers. Students have made real gains in math and science, but racial and ethnic achievement gaps are among the very largest in the nation, and low-income students are least likely to have access to science labs or teachers who say they have the resources they need.

The state also has troubling gender gaps. Girls lag behind in 4th-grade science, and the gaps widen dramatically later on. In college, women earn fewer than a third of STEM degrees or certificates in the state. Business leaders stand ready to work with educators and states to promote greater equity.

STEM SKILLS ARE IN DEMAND

In Pennsylvania, STEM skills have stayed in demand even through the economic downturn.

STEM:
2.4 jobs for every
1 unemployed person



Non-STEM:
3.1 unemployed people for every **1 job**



CAN PENNSYLVANIA MEET THE DEMAND FOR STEM SKILLS?

Students have made real academic strides in most states, but no state is on track to getting all students the STEM skills they need to succeed in college and careers. Low-income and minority students lag farthest behind.

Students have improved in math

Since 2003, eighth graders in Pennsylvania have made gains on the National Assessment of Educational Progress (NAEP), also known as “the nation’s report card.” Yet most still have far to go to reach a score of 299, NAEP’s cutoff for “Proficient” performance.

8th Grade NAEP scale scores, 2003 & 2011

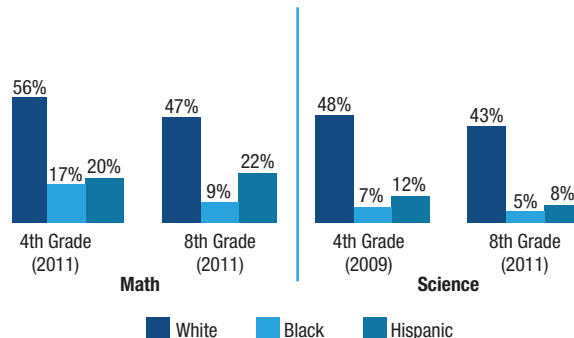
	NAEP Scale Score		Change Since 2003	
	2003	2011	PA	Most Improved State
All	279	286	+8	+17 (DC)
Low Income	257	268	+11	+19 (MA)
White	285	294	+9	+17 (HI)
Black	247	257	+10	+19 (NJ)
Hispanic	253	269	+16	+24 (AR)

Totals may not sum due to rounding errors.

Closing achievement gaps must remain a priority

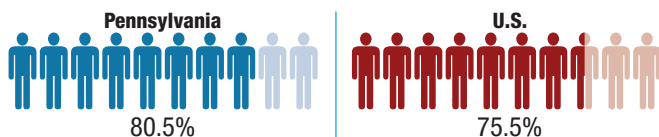
No state has closed the persistent achievement gaps among racial and ethnic groups.

Percentage of students scoring at or above proficient in math and science, 2009 & 2011

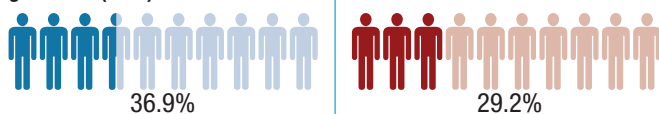


Pennsylvania must plug gaps in the STEM pipeline from high school through college

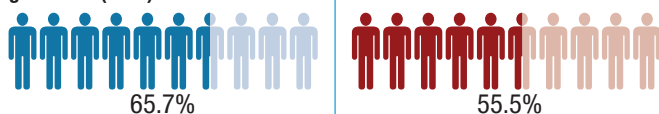
What percentage of high school students graduate? (2009)



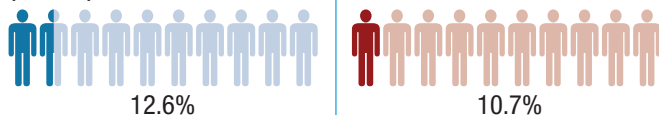
Of students who enter a two-year degree program, what percentage graduate? (2009)



Of students who enter a four-year degree program, what percentage graduate? (2009)



What percentage of college degrees and certificates are in STEM fields? (2008-09)



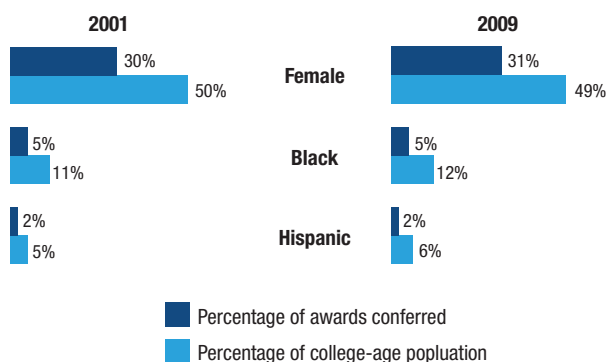
No student should need remediation

Pennsylvania did not provide data on the cost and extent of college remediation in math.

Women and minorities are too critical a resource to remain untapped

Women and minorities are a very large share of the population but they earn just a small share of STEM degrees and certificates.

Percentage of degrees/certificates conferred in STEM fields in Pennsylvania



WILL PENNSYLVANIA FIRM ON HIGH EXPECTATIONS?

Setting high expectations is a critical step toward raising student performance in STEM.

Pennsylvania is showing a commitment to high expectations

Pennsylvania has joined **44 other states in adopting Common Core State Standards** in math. Pennsylvania is also working with other states on common math tests to gauge students' mastery of those standards.

Common standards and tests in math could be a game changer

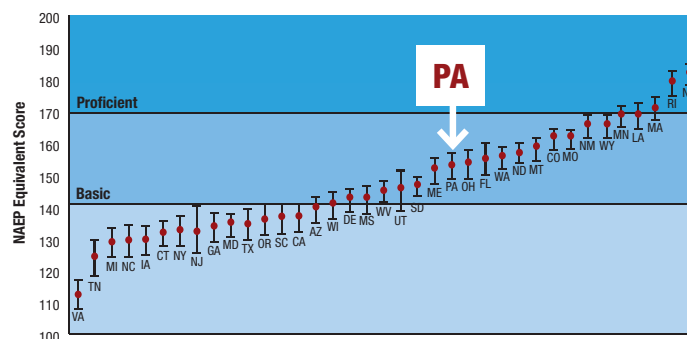
As **states adopt common tests aligned to the Common Core**, they will also have to **set a common high passing score** or threaten the credibility of the entire common standards enterprise. As the bar goes up, the rate of Pennsylvania students passing the tests may plummet. Pennsylvania **leaders will have to stand strong** on high expectations, even in the face of pressure to back down.

Science is the next frontier for better standards and higher expectations

Twenty-six states, not including Pennsylvania, are collaborating on common **"Next Generation" content standards in science**, which they aim to complete in 2013. If these standards meet a high bar, Pennsylvania should adopt them or standards as rigorous.

Pennsylvania sets the passing score on its 8th-grade science test higher than most other states do, though it still falls far short of NAEP's bar for proficiency.

NAEP scale equivalents of grade 8 science standards for proficient performance, by state, 2009



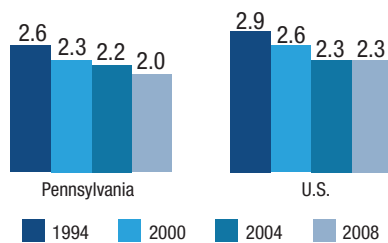
ARE STUDENTS EXPOSED TO CHALLENGING AND ENGAGING CONTENT?

Lack of access to such content severely limits young people's college and career prospects.

Building a strong foundation in science takes time

Time for science in Pennsylvania elementary schools has fallen since 1994.

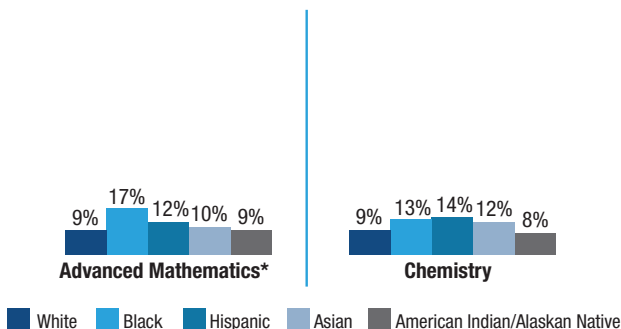
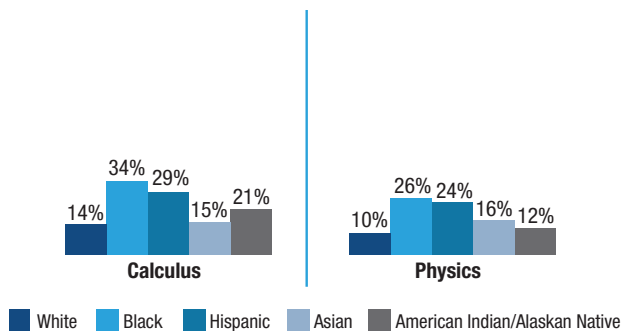
Hours per week spent on science in grades 1–4, 1994–2008



Students of all backgrounds need access to challenging math and science courses

Nationwide, many minority students lack access to such courses.

Percentage of students in schools that do not offer challenging math and science courses, by race/ethnicity, 2009



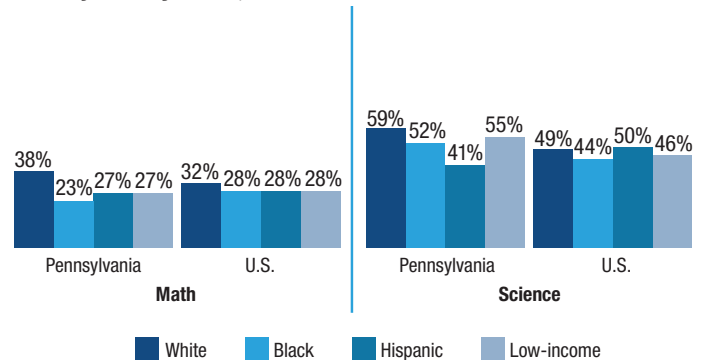
* Includes trigonometry, elementary analysis, analytic geometry, statistics, and precalculus

ARE TEACHERS PREPARED TO TEACH TO HIGH STANDARDS?

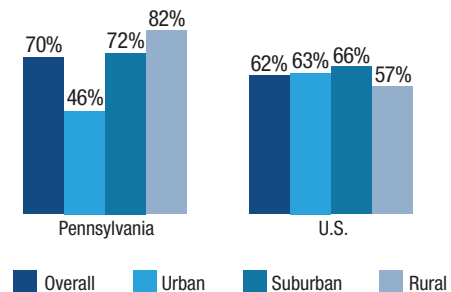
Research shows that teachers' content knowledge and teaching experience can affect student performance.

Teachers need deep content knowledge

8th graders whose teachers have an undergraduate major in the subject they teach, 2011



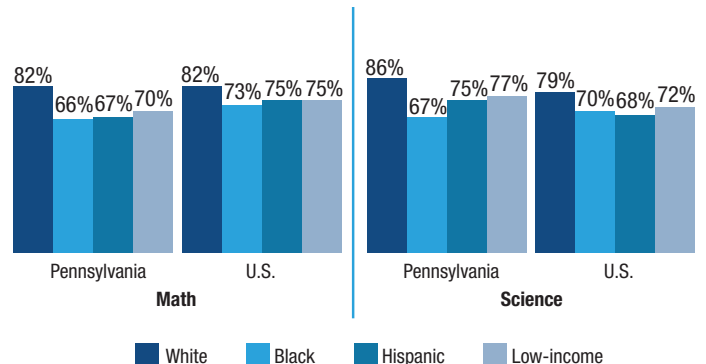
8th graders whose science teachers took three or more advanced science courses in college, 2011



High-need schools need to retain excellent teachers

In most states, minority and low-income students are more likely to have inexperienced teachers, indicating high turnover rates.

8th graders whose teachers have 5+ years of experience teaching their subject, 2011



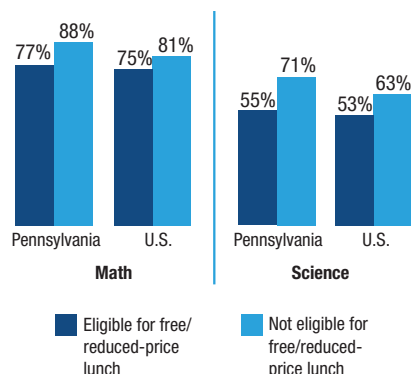
* Reporting standards not met.

For the complete state report, methodology, and sources, visit changetheequation.org/stem-vital-signs.

DO SCHOOLS AND TEACHERS IN PENNSYLVANIA HAVE WHAT THEY NEED TO SUCCEED?

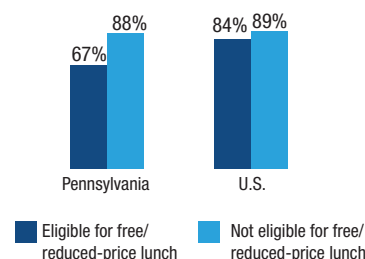
Teachers need the tools of their trade

8th graders whose teachers say they have all or most of the resources they need, by income, 2011



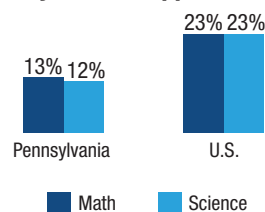
All students need access to science facilities and supplies

8th graders whose schools have science labs, by income, 2011



Parent support and engagement are critical to student success

Teachers who say lack of support is a serious problem, 2011



For the complete state report, methodology, and sources, visit changetheequation.org/stem-vital-signs.

RECOMMENDATIONS

Impatience is a virtue when it takes data and real solutions as its guides. The time to act is now. These Vital Signs provide business, education, state and policy leaders with an extensive and reliable set of indicators to promote STEM learning and high expectations for all students. We've crunched the numbers to offer insights into much-needed actions that can be undertaken right away with resolve.

■ Make science count

Pennsylvania tests students in science, but it only holds schools accountable for meeting student performance targets on reading and math tests. Science should count, too. When there are no consequences for science achievement, schools can easily give science short shrift. But simply holding schools accountable for science is not enough. Pennsylvania should also raise the passing score on the state science tests. For example, the bar on its 8th-grade science test is so low that schools would be held accountable for meeting a weak standard.

■ Ease the transition between high school and college

Pennsylvania students should understand the requirements for college admission and whether a high school diploma prepares them for college-level work. One way to ensure that diplomas have meaning is to align state

high school graduation and college entrance requirements. Pennsylvania also should expand access to rigorous courses in math and science. For example, the state could strengthen initiatives that help schools boost participation in AP courses, especially among women and minorities.

■ Attend to achievement gaps

Pennsylvania continues to struggle with very large racial, ethnic and income-based achievement gaps in math and science. There is also evidence that the state's minority and low-income students have less access to educational opportunities, such as rigorous coursework, qualified teachers who feel well supported and other educational resources. Pennsylvania should ensure that its policies offer extra support to the students who need it most—while continuing to hold those students to a high bar.